Adversarial Diffusion Distillation

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Abstract

We introduce Adversarial Diffusion Distillation (ADD), a novel training approach that efficiently samples large-scale foundational image diffusion models in just 1-4 steps while maintaining high image quality. We use score distillation to leverage large-scale off-the-shelf image diffusion models as a teacher signal in combination with an adversarial loss to ensure high image fidelity even in the low-step regime of one or two sampling steps. Our analyses show that our model clearly outperforms existing few-step methods (GANs, Latent Consistency Models) in a single step and reaches the performance of state-of-the-art diffusion models (SDXL) in only four steps. ADD is the first method to unlock single-step, real-time image synthesis with foundation models. Code and weights available under https://github.com/Stability-AI/generative-models and https://huggingface.co/stabilityai/ .